

Solid State Technology Cumulative Index 1984

Articles and Authors	Issue Page	Articles and Authors	Issue Page
A Comparison of MOS Processes for VLSI (Part I) H.E. Oldham, S.L. Partridge (Part II) Jun 177 Sep 249		Gold Contacts to Semiconductor Devices James W. Mayer Growth of GaAs Single Crystal for Optoelectronic Applications G.S. Kamat Guidelines for Establishing an Effective ESD Program Donald L. Denton Guidelines for Publication of High Resolution Resist Parameters Gary N. Taylor	Jul 149 Jan 173 Jan 127 Jun 105
A Flexible Approach for Generation of Arbitrary Etch Profiles in Multilayer Films A.S. Bergendahl, D.L. Harmon, N.T. Pascoe Nov 107		High Resolution Dose Uniformity Monitoring of Ion Implanters (Part I) Jeffrey R. Golin, James A. Glaze (Part II) Aug 137 Sep 289	
A Novel Boron Spin-On Dopant B.H. Justice, G.S. Wooster R.F. Aycock, D.R. Saunders Oct 153		High Throughput Submicron Lithography with Electron Beam Proximity Printing H. Bohm, U. Behringer, J. Keyser, P. Nehmiz, W. Zapka, W. Kulcke Sep 210	
A Small Experimental PCB Robotic Assembly System William L. Huck Advanced CMOS Epitaxial Processing for Latch-Up Hardening and Improved Epilayer Quality John Ogawa Borland, Tom Deacon Advances in X-Ray Mask Technology A.R. Shimkus Air and Nitrogen-Fireable Multilayer Systems: Materials and Performance Characteristics (Part I) B.E. Taylor, R.R. Getty, J. Henderson, C.R.S. Needes (Part II) Alignment Signals for Electron Beam Lithography Yi-Ching Lin, Andrew R. Neureuther An Experimental Approach to Vapor Phase Reflow Solder Assembly Larry R. Lichtenberg Automated Inspection of Wafer Patterns with Applications in Stepping, Projection and Direct-Write Lithography Karl L. Harris, Paul Sandlin, Russell M. Singleton Automated Wafer Processing Using Robots Mitchell Weiss Bipolar Device Packaging—Electrical, Thermal, and Mechanical Stress Considerations L.M. Mahalingam, D.J. Reed B-Si Masks for Storage Ring X-Ray Lithography R.E. Acosta, J.R. Maldonado L.K. Towari, J.M. Warlaumont Clean Room: The Common Sense Approach to Effectiveness Michael K. Kilpatrick Considerations in the Hermetic Packaging of Hybrid Microcircuits Marjorie Byrnes, Jerry L. Carter Jerry E. Sargent, Dennis King Contact Hole Etching in a Load-Locked Hexagonal Reactive Ion Etching System S. Shanfield, M. Hendriks Contamination Control: New Dimensions in VLSI Manufacturing Don L. Tolliver Contamination Prevention and Protection for Process Gases William Kroll Corrosion Protection for Semiconductor Packaging Karl W. Rosengarth, Jr. Current Status of X-Ray Lithography (Part I) Armand P. Neukermans (Part II) Deposition and Patterning of Tungsten and Tantalum Polyicides Stephen E. Clark, J.-K. Tsang, James W. Maroff Development of Adhesive Die Attach Technology in Cerdip Packages, Materials Issues F.K. Moghadam Determination of Diffusion Characteristics Using Two and Four-Point Probe Measurements Roger Brennan, David Dickey Dielectric Breakdown of Gate Insulator Due to Reactive Ion Etching Tohru Watanabe, Yukimasa Yoshida Dimensional Errors in Stepping Lithography Hans R. Rottman Direct Write Electron Beam Lithography—A Production Line Reality H.C. Pfeiffer Dry Etching Induced Damage in Si and GaAs S.W. Pang Effects of Heavy Metal Contamination from Corrosive Gas and Dopant Handling Equipment in Silicon Wafer Processing K.M. Eisele, E. Klausmann Effects of Oxygen and Internal Gettering on Donor Formation Dinesh C. Gupta, Robert B. Swaroop Electromigration Testing of Thin Films at the Wafer Level Janet M. Towne Electron-Beam Customization, Repair, and Testing of Wafer-Scale Circuits D.C. Shaver Electron Beam Resist Systems—A Critical Review of Recent Developments M.P.C. Watts Electronics Assembly Robots: U.S. vs. Japan Charles-Henri Mangin Epitaxial Silicon for Bipolar Integrated Circuits H.M. Liaw, J. Rose, P.L. Fejes Equipment Requirements for Sub-Micron VLSI Production Wilmer R. Bottoms Evaporated As ₂ S ₃ —Reproduction Fidelity for Microelectronics B. Mednikarov Flexible Material Handling Automation in Wafer Fabrication James G. Harper, Louis G. Bailey Jun 177 Sep 249 Nov 107 Oct 153 Sep 303 Aug 123 Sep 192 Mar 180 Apr 291 Feb 117 Feb 183 Feb 159 Jul 163 May 167 Oct 235 Mar 151 Aug 183 Nov 213 Apr 235 Nov 203 Mar 129 May 220 Jun 191 Sep 185 Oct 235 Jan 149 Dec 125 Apr 263 Jul 139 Sep 223 Apr 249 Oct 177 Aug 113 Oct 197 Feb 135 Aug 155 May 177 Jul 119 May 135 Aug 155 May 177 Jul 89			
		Interconnecting and Packaging VLSI Chips A.H. Monea, R.K. Spielberger Ion Beam Resists John E. Jensen Ion Cluster Beam Deposition Technology Peter R. Younger Laser-Plasma Interactions for the Deposition and Etching of Thin-Film Materials Philip J. Hargis, Jr., James M. Gee LPCVD Process Equipment Evaluation Using Statistical Methods R. C. Rossi Magnetic Field Enhanced Reactive Ion Etching Eari R. Lory Management of AlCl ₃ in Plasma Etching Aluminum and its Alloys John E. Spencer Materials for Optical Storage V.B. Jipson, K.Y. Ahn MeV Implantation for Silicon Device Dipanjan Pramanik, Michael I. Current Microelectronic Ball-Bond Shear Test—A Critical Review and Comprehensive Guide to its Uses George G. Harman Multilayer Resists for Fine Optical Lithography E. Ong, E.L. Hu Multilevel Metallization Device Structures and Process Options Sal T. Mastrianni New Applications of Tape Bonding for High Lead Count Devices James F. Marshall New Thick Film Capacitor Dielectrics S.J. Stein, C. Huang, P. Bleas Nitrogen Trifluoride—A New Dry Etchant Gas Andrew J. Woytek, J. Ted Lileck, John A. Barkanic Novolac Resins Used in Positive Resist Systems T.R. Pampalone Optimization of a Photore sist Process Using Statistical Design of Experiments Michael Johnson, Karen Lee Parameters Affecting Silver Flake and Powder Performance in Silver Filled Polymers Barbara L. Roos-Kozel, Frances M. Casavecchia Particulate Contamination and Device Performance J.M. Duffalo, J.R. Monkowski Photore sist Particle Control for VLSI Microlithography Mary L. Long Plasma Effluent Etching: Selective and Non-Damaging J. Dieleman, F.H.M. Sanders Polyimide for High Resolution Ion Implantation Masking T.O. Herndon, R.L. Burke, J.A. Yasaitis Polymers in Electronics (Part I) Juay H. Lei, Samson A. Jenekhe (Part II) Ronald J. Jensen, Michele Royer Positive Photore sist Polymerization Through Pulsed Photomagnetic Curing Paul A. Ruggiero Practical Aspects of Microfabrication in the 100 nm Regime D.P. Kern, P.J. Coane, P.J. Houzegro, T.H.P. Chang Preflow Solder Ceramic Lids for Hermetic Packages Walter M.C. Yang Present Status of Arsenic Planar Diffusion Sources R.J. Tressler, H.J. Boeglinski, J. Monkowski J. Stach, Gabe De Munda, Charles Volk Process and Film Characterization of PECVD Borophosphosilicate Films for VLSI Application Jerry E. Tong, Kurt Schertenleib, Ronald A. Carpio Process Modeling of Phosphorus Diffusion in Silicon—A New Model G. Erranna, D. Kakati Production RIE: I. Selective Dielectric Etching Daniel H.G. Choe, Chris Knapp, Adir Jacob Aug 137 Sep 289 Aug 123 Sep 210 Mar 119 Jan 135 Jan 119 Jun 145 Nov 143 Nov 203 Jan 141 May 211 Nov 117 May 186 Jun 155 May 155 Aug 175 Oct 213 Mar 172 Jun 115 Sep 281 Aug 167 Mar 109 Mar 159 Apr 191 Nov 179 Nov 165 Dec 149 Oct 165 Feb 127 Dec 137 Oct 165 Jan 161 Dec 116 Apr 177	

Cumulative Index—1984 *continued*

Articles and Authors	Issue Page	Articles and Authors	Issue Page
Productivity and Process Feedback Kenneth Levy	Jul 103	The Effect of Porosity on Mechanical, Electrical and Thermal Characteristics of Conductive Die-Attach Adhesives Richard H. Eates	Aug 191
Profile Control in Plasma Etching of SiO ₂ R.N. Castellano	May 203	The Future and Potential of Optical Scanning Systems D.A. Marke	Sep 159
Profile Formation in CVD BE J.D. Crinn, I. Adesida, E.D. Wolf	May 123	The Role of Inorganic Materials in Dry-Processed Resist Technology Gary N. Taylor, Thomas M. Wolf, Larry E. Stillwagon	Feb 145
Purification of Deionized Water by Oxidation with Ozone Cari Nebel, William W. Nezgod	Oct 185	The Use of Radiant Infrared in Soldering Surface Mounted Devices to Printed Circuit Boards Stephen J. Dow	Nov 191
Reactive Ion Etching: Its Basis and Future (Part I) D. Bollinger, S. Iida, O. Matsumoto (Part II)	May 111	Testing: A Major Concern for VLSI Matthew C. Graf	Jan 101
Recent Developments in Electron Resists E.D. Roberts	Jun 167	Thermal Evaluation of VLSI Packages Using Test Chips—A Critical Review Frank F. Oettinger	Feb 169
Reduction Lenses for Submicron Lithography Takashi Omata	Jun 135	Trends in Automated Diffusion Furnace Systems for Large Wafers Joseph C. Maliaikai, Daniel J. Fisher, Jr., Arthur Waugh	Dec 105
Refractory Metals and Metal Silicides for VLSI Devices John Y. Chen, Lynette B. Roth	Sep 173	Trends in High Voltage Integrated Circuit Technology Ray Roop	May 147
Robot Transfer System for Wafer Processing Loren E. Shaeffer	Aug 145	Ultra-High Efficiency Membrane Filters for Semiconductor Process Gases Mauro A. Accomazzo, Kenneth L. Rubow, Benjamin Y.H. Liu	Mar 141
Selective Plasma Etching of Polysilicon Paul C. Chang, Steve Hsieh	Nov 155	Uniform Plasma Etching of Printed Circuit Boards R.D. Rust, R.J. Rhodes, A.A. Parker	Apr 270
Selective Reactive Ion Etching of Silicon Dioxide J.S. Chang	Sep 239	VLSI Multilevel Metallization (Part I) A.N. Saxena, D. Pramanik	Dec 93
Silicon CVD for SOI: Principles and Possible Applications L. Jasztressi	Apr 225	VLSI Packaging Reliability Eugene C. Blackburn	Jan 113
Silicon Processing with Silicon Carbide Furnace Components Bryan D. Foster, R.E. Tressler	Sep 214	Wafer Fabrication and Process Automation Research at Stanford University Brian K. Reid, John D. Shott, James D. Meindl	Jul 126
SMIF: A Technology for Wafer Cassette Transfer in VLSI Manufacturing Mihir Parikh, Ulrich Kaempf	Oct 143	X-Ray Resist Trends Gary N. Taylor	Jun 124
Structure/Property Relationships in Experimental Thick-Film Interfaces Dana L. Hankay, Jeffrey A. Goldman, Patrick J. Moran	Sep 286		
Surfaces, Science...Fact, Not Fiction David W. Harris	Apr 278		

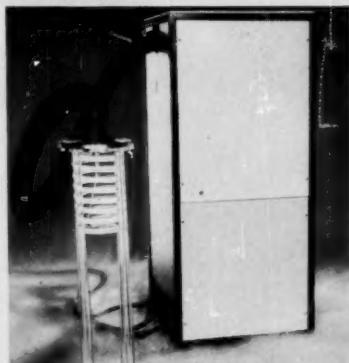
Authors

Accomazzo, Mauro A.	Mar 141	Golin, Jeffrey R.	Aug 137	Long, Mary L.	Mar 159	Rottman, Hans R.	Jul 139
Acosta, R.E.	Oct 205	Graf, Matthew Co.	Sep 289	Lory, Earl R.	Nov 117	Royer, Michele	Nov 165
Adesida, I.	May 123	Gupta, Dinesh C.	Jan 101	Mahalingam, L.M.	May 167	Rubow, Kenneth L.	Dec 149
Ahn, K.Y.	Jan 141	Hankey, Dana L.	Aug 113	Maldonado, J.R.	Oct 205	Ruggiero, Paul A.	Mar 141
Aycock, R.F.	Oct 153	Hargis, Jr., Philip J.	Sep 266	Maliaikai, Joseph C.	Dec 105	Rust, R.D.	Apr 270
Bailey, Louis G.	Jul 89	Harman, George G.	Nov 127	Mangin, Charles-Henri	Jul 119	Sanders, F.H.M.	Apr 191
Barkanic, John A.	Mar 172	Harmon, D.L.	May 186	Markle, D.A.	Sep 159	Sandland, Paul	Feb 159
Behringer, U.	Sep 210	Harper, James G.	Nov 107	Marolf, James W.	Apr 235	Saunders, D.R.	Oct 153
Bergendahl, A.S.	Jan 107	Harris, David W.	Apr 278	Marshall, James F.	Aug 175	Saxena, A.N.	Dec 93
Blackburn, Eugene C.	Jan 113	Harris, Karl L.	Feb 159	Mastronanni, Sal T.	May 155	Scherterlein, Kurt	Jan 161
Bless, P.	Oct 213	Henderson, J.	Mar 180	Matumoto, O.	May 111	Sergent, Jerry E.	Aug 183
Boeglitz, H.J.	Oct 165	Hendrikx, M.	Apr 291	Mayer, James W.	Jul 149	Shanfield, S.	Nov 203
Bohlen, H.	Sep 210	Herndon, T.O.	Nov 203	Mednikarov, B.	May 177	Shaun, Loren E.	Nov 155
Bollinger, D.	May 111	Hoenig, Stuart A.	Mar 119	Meindl, James D.	Jul 126	Shaver, D.C.	Feb 135
Borland, John Ogawa	Jun 167	Houzege, P.J.	Feb 127	Moghadam, F.K.	Jan 149	Shimkunas, A.R.	Sep 192
Bottoms, Wilmer R.	Aug 123	Hsieh, Steve	Apr 225	Mones, A.H.	Jan 119	Shott, John D.	Jul 126
Brennan, Roger	Aug 155	Hu, E.L.	Jun 155	Monkowski, J.R.	Mar 109	Singleton, Russell M.	Feb 159
Burke, R.L.	Dec 125	Huang, C.	Oct 213	Mayer, James W.	Oct 165	Smith, James F.	Jan 135
Byrnes, Marjorie	Nov 179	Huck, William L.	Sep 303	Mednikarov, B.	Sep 266	Spencer, John E.	Apr 203
Carpic, Ronald A.	Aug 183	Iida, S.	May 111	Neiman, Patrick J.	Oct 185	Spielberger, R.K.	Jan 119
Carter, Jerry L.	Jan 161	Jacob, Adir	Apr 177	Nebel, Carl	Oct 185	Slach, J.	Oct 165
Casavicechia, Frances M.	Aug 183	Jastrzebski, L.	Sep 239	Needles, C.R.S.	Mar 180	Stein, S.J.	Oct 213
Castellano, R.N.	May 203	Jensen, John E.	Dec 149	Nehmiz, P.	Apr 291	Stillwagon, Larry E.	Feb 145
Chang, J.S.	Apr 214	Jensen, Ronald J.	Nov 165	Neukermans, Armand P.	Sep 185	Swaroop, Robert B.	Aug 113
Chang, Paul C.	Apr 225	Jipson, V.B.	Dec 149	Neureuther, Andrew R.	Sep 210	Taylor, B.E.	Mar 180
Chang, T.H.P.	Feb 127	Johnson, Michael	Jan 141	Nezgod, William W.	Oct 185	Taylor, Gary N.	Apr 291
Chen, John Y.	Aug 145	Justice, B.H.	Sep 281	Oettinger, Frank F.	Feb 169	Tolliver, Don L.	Feb 145
Chinn, J.D.	May 123	Kakati, D.	Oct 153	Oldham, H.E.	Jun 177	Tong, Jerry E.	Jun 105
Choe, Daniel H.G.	Apr 177	Kamath, G.S.	Dec 116	Omate, Takashi	Sep 249	Towart, L.K.	Jun 124
Clark, Stephen E.	Apr 235	Keyser, J.	Sep 210	Pampalone, T.R.	Jun 115	Towner, Janet M.	Oct 197
Coane, P.J.	Feb 127	Kilpatrick, Michael K.	Mar 151	Pang, S.W.	Apr 249	Tressler, R.E.	Oct 143
Current, Michael I.	May 211	King, Dennis	Aug 183	Parikh, Mihir	Jul 111	Tsang, J.-K.	Apr 235
Daniel, Steven	Mar 119	Klausmann, E.	Oct 177	Parker, A.A.	Apr 270	Volk, Charles	Oct 165
Deacon, Tom	Aug 123	Kroll, William	May 220	Partridge, S.L.	Jun 177	Warlaumont, J.M.	Oct 205
De Munda, Gabe	Oct 165	Kulcke, W.	Sep 210	Pascoe, N.T.	Nov 107	Watanabe, Tohru	Apr 263
Denton, Donald	Jan 127	Lai, Juey H.	Nov 165	Pfeiffer, H.C.	Sep 223	Wells, M.P.C.	Feb 111
Dickey, David	Dec 125	Lai, Karen	Sep 281	Praumanik, Dipankar	May 211	Waugh, Arthur	Dec 105
Dieleman, J.	Apr 191	Levy, Kenneth	Jul 103	Reed, D.J.	May 167	Weiss, Mitchell	Jul 163
Dow, Stephen J.	Nov 191	Liaw, H.M.	May 135	Reid, Brian K.	Jul 126	Wolf, E.D.	May 123
Duffalo, J.M.	Mar 109	Lichtenberg, Larry R.	Feb 183	Rhodes, R.J.	Apr 270	Wolf, Thomas M.	Feb 145
Eisele, K.M.	Oct 177	Lileck, J. Ted	Mar 172	Roberts, E.D.	Jun 135	Wooster, G.S.	Oct 153
Eranna, G.	Dec 116	Liu, Yi-Ching	Feb 117	Roop, Ray	May 147	Woytek, Andrew J.	Mar 172
Estes, Richard H.	Aug 191	Liu, Benjamin Y.H.	Mar 141	Roos-Kozai, Barbara L.	Aug 167	Yang, Walter M.C.	Dec 137
Fejes, P.L.	May 135	Liu, Benjamin Y.H.	Aug 165	Rose, J.	May 135	Yasaitis, J.A.	Nov 179
Fisher, Daniel J. Jr.	Dec 105	Liu, Benjamin Y.H.	Dec 149	Rosenthal, Jr., Karl W.	Jun 191	Yoshida, Yukimasa	Apr 263
Foster, Bryan D.	Oct 143	Liu, Benjamin Y.H.	Sep 281	Rossi, R.C.	Nov 227	Younger, Peter R.	Nov 143
Gee, James M.	Nov 127	Liu, Benjamin Y.H.	Oct 177	Roth, Lynette B.	Aug 145	Zapka, W.	Sep 210
Getty, R.R.	Mar 180	Liu, Benjamin Y.H.	Sep 173				
Glaze, James A.	Aug 137						
Goldman, Jeffrey A.	Sep 289						
	Sep 268						

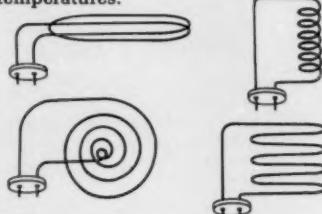
advertisers index

ASM/America, Advanced Semiconductor Materials America, Assembly Products Group	92
ASM Lithography, Inc.	57
ARI Industries Inc.	177
Advanced Crystal Sciences, Inc.	27
Advanced Energy	29
Air Products and Chemicals, Inc.	157
Allied Chemical	172, 173
Alnor Instrument Company	76
American Hoechst Corporation	119
Amplifier Research	75
Anicon, Inc.	34, 35
Apache Chemicals, Inc.	48
Applied Materials, Inc.	102, 103
Atcor	6
Auer Precision Co., Inc.	171
BTU Engineering Corporation	147
Balzers	121
Behm Quartz Technology Inc.	82
Branson/IPC	18, 19
Bruce Systems	147
Burleigh Instruments, Inc.	177
CHA Industries	83
CVC Products, Inc.	101
CVI Incorporated	175
Canon U.S.A., Inc., Semiconductor Equipment Division	22, 23, 86-89
Cerac Inc.	78
Comp-Aire Systems, Inc.	31
Cooke Vacuum Products Inc.	81
Cybeq Systems	10
Denton Vacuum, Inc.	84
Ditric Optics, Inc.	176
Dow Chemical Company	122, 123
Drytek	25
EM Chemicals	73, 114, 115
ENI Power Systems, Inc.	Cover III
Eastman Kodak	46, 47
Eaton Corporation	113
Edmont	104
Electro-Science Laboratories, Inc.	80
Electro Scientific Industries, Inc.	37
GCA Corporation, IC Systems Group	3, 14, 15
Grieve Corporation, The	176
Halocarbon Products Corp.	112
Heraeus Amersil, Inc.	134, 135
Hiac/Royco Instruments Division	42
Hoya Electronics	55
Hunt Chemical	63, 68
ITP Incorporated	1
International Scientific Instruments, Inc.	161
Kimberly-Clark Corporation	146
Kulicke and Soffa Industries	43
LFE, Semiconductor Equipment Division	136
LTX Corporation	159
E. Leitz Inc.	167
Leybold-Heraeus GmbH	56
Leybold-Heraeus Technologies	56
Leybold-Heraeus Vacuum Products Inc.	67, 69, 71
Lindberg	85
Linde, Union Carbide	30
MKS Instruments, Inc.	74
MRL Industries Inc.	132
MSI Electronics Inc.	166
Materials Development Corporation	26
Materials Research Corporation	4
Matheson Gas Products	70, 180
Millipore Corporation	45
Motor Guard Corporation	180
Nanometrics Incorporated	77, 79
National Laser Trimming Co.	168
NGS Associates	168
Newport Corporation	184
Nikon Inc. Precision Inc.	90
Norton Chemplast	179
Particle Measuring Systems Inc.	124
Perkin-Elmer Applied Optics Division	7
Perkin-Elmer Semiconductor Equipment Group	Cover IV
Plasma-Therm, Inc.	133
Polycold Systems, Inc.	183
Quartz Engineering and Materials, Inc.	155
Quartz Scientific, Inc.	169
Radiant Technology Corporation	120
Research Devices, Inc.	143
Rudolph Research Corp.	174
J.C. Schumacher Company	64, 65
Scientific Sealing Technology	166
Semiconductor Equipment and Materials Institute (SEMI)	156
Semiconductor Services	177
Shipley Company, Inc.	38, 39
Sigmund Cohn Corp.	178
Solid State Equipment Corp.	5, 72
Spectramass Inc.	148
Temescal, a division of the BOC Group, Inc.	33
Tempress, A Unit of General Signal	17, 144, 145
Tencor Instruments	9, 11
The Carborundum Company	165
Thin Film Instruments	176
UTI Instruments Co.	41
Ultratech Stepper, A Unit of General Signal	58
Ulvac Corporation	163
Union Carbide Corp.	30
VAT	110, 111
Varian, Thin Film Technology Division	13, 21
Veeco, Industrial Equipment Div.	Cover II, 49-54
Employment Opportunities	
Computer Avionics	158
Hi-Tech Research	158
Materials Research Corp.	158

New fast cycle water vapor cryopump cuts pumpdown times in half.



New PFC fast cycle water vapor cryopumps provide high pumping speeds where needed: in the process chamber — not behind conductance-limiting high vacuum valves and manifolds. Speed ratings are as high as 70,000 liters/second in the chamber! The total regeneration time is less than four minutes — including full defrost and recool to cryopumping temperatures.



Cryocoil configurations permit pumping water vapor at the work area where it is needed. Optional shapes include "Trombone" and "Flat Serpentine."

Polycold PFC cryopumps are ideal for upgrading vacuum chambers now using either diffusion pumps or helium cryopumps. PFCs complement these "permanent gas" pumps and handle your water vapor problems fast, even in humid summer weather. They typically pump 2½ times faster than diffusion pumps, or five times faster than helium cryopumps on an equal investment basis. Prices range from \$7,000 to \$15,000.

If you have any doubts, just ask a Polycold PFC user. Write today for complete details. Polycold Systems, Inc., 67 Mark Drive, San Rafael, CA 94903. Or call 415/479-0577.

Polycold
systems, inc.

Circle 183